

being identified in the claim. Referring to Figure 3 of the present application, the axis of symmetry for the hemisphere is identified with the reference number 6. As can be seen, it bisects the hemispherical surface 26. This is the axis that is identified in claim 9. In contrast, claim 11 recites the axis of each of the *openings*. In Figure 3, these axes are indicated by the reference numerals 18 and 19. As can be seen, they pass through the centers of the openings 16 and 17. As further recited in claim 11, these axes (18, 19) intersect the axis of symmetry (6) at the center of the hemisphere (20).

Accordingly, it is respectfully submitted that claims 9-15 comply with the second paragraph of 35 U.S.C. §112.

Claims 9-15 were rejected under 35 U.S.C. §103, on the grounds that they were considered to be unpatentable over the *Allen et al.* patent (U.S. 4,739,176). The rejection states that the *Allen* patent fails to disclose a cavity in an end face having a hemisphere-shaped inner surface and a light source in it, as claimed. However, the rejection goes on to refer to the light sources 52 and 53 illustrated in Figure 4, and suggests that they are located in a spherical design cavity above the thread 10.

This aspect of the Office Action was discussed during the above-noted interview. The Examiner referred to the spherical end surfaces of the light elements 52 and 53 and suggested that they connote a spherical cavity. As pointed out by Applicants' representative, however, the spherical surface is only disclosed in connection with the *light elements*. The *cavities* in which these light elements are disposed do not have a complementary spherical shape. Rather, as can be seen in Figure 4, each light element is disposed within an inclined passage 56. This inclined

passage terminates at a planar filter 58. The intersection of the passage with the filter does not define a hemispherical surface. Rather, the end of the cavity is defined by straight lines.

The Examiner stated that it might be obvious to fill the void between the light elements 52, 53 and the filter 58 with additional filter material, which would result in a hemispherical shaped cavity. It is respectfully submitted, however, that it would not be obvious to modify the disclosure of the *Allen* patent in this manner.

First, there has been no reference cited in support of such a modification. The *Allen* patent itself does not teach that the ends of the passages 56 are hemispherically shaped. Since there is no other teaching to suggest that such a modification is desirable, there is no basis to allege that it would be obvious.

Second, the proposed modification would be counterintuitive, since it would result in a more complex, and expensive, manufacturing process. As disclosed, the *Allen* structure employs a planar filter 58 with a diffuser 60 on the interior surface thereof. A planar structure of this type is relatively easy to manufacture. In contrast, if the shape of the filter were modified to conform to the shapes of the ends of the light elements 52, 53, a more complex and expensive molding processing would be required to form the filter. There is no apparent reason why a person of ordinary skill in the art would want to do this. During the interview, the Examiner suggested that a filter having a shape complementary to the ends of the light elements 52, 53 would avoid light scattering within the voids at the ends of the passages. However, in the context of the *Allen* patent, light scattering does not appear to be a problem, particularly in view of the fact that the filter 58 is coated with a diffuser 60. The structure of the *Allen* patent is not designed as an imaging device, where scattered

light may be problematic. Rather, it is only designed to *illuminate* the thread, and therefore the scattering of light would not be disadvantageous.

For at least these reasons, therefore, it is respectfully submitted that it would not be obvious to modify the disclosure of the *Allen* patent to provide hemispherically shaped surfaces at the ends of the passages 56.

Furthermore, even if such a modification were made, it is respectfully submitted that the resulting structure would still not fall within the scope of claim 9. For instance, claim 9 recites that the hemisphere-shaped surface "faces" the thread. In contrast, if the Allen structure were modified to provide hemispherical shapes at the inner ends of the passages, these surfaces would face away from the thread.

Another basis of distinction, the last element recited in claim 9 is a detector "disposed on an axis of symmetry extending through the center of the hemisphere..." If the structure of the *Allen* patent is modified to produce hemispherical surfaces at the ends of the passages 56, the axes of symmetry of these surfaces would coincide with the leads 70 of the light elements, as shown in Figure 4. In other words, they would be the longitudinal axes of the passages 56. The *Allen* patent does not disclose that a detector is disposed on such axes. Rather, as can be seen in Figure 4, the photodetector 62 is disposed on a different axis which is perpendicular to the thread 10. Similarly, if one looks at the orientation illustrated in Figure 3 of the *Allen* patent, it can be seen that the detector 62 is disposed on an axis that is perpendicular to the axis of symmetry of the hemispherically shaped ends of the light elements. Again, this axis of symmetry coincides with the leads 70 of the light elements.

For the foregoing reasons, therefore, it is respectfully submitted that the *Allen* patent does not suggest the subject matter recited in claim 9. For example, it does not disclose an end face defining a plane parallel to the thread which has a cavity with a hemisphere-shaped inner surface that faces the thread. Nor would it be obvious to modify the teachings of the *Allen* patent to provide a cavity with such a shape. Furthermore, even if the patent were modified to provide passages whose shapes are complementary to those of the light sources, the resulting structure still would not possess the total combination of features recited in the claim.

Additional distinguishing features of the invention are recited in the dependent claims. In light of the differences identified above, a detailed discussion of these additional features is believed to be unnecessary at this time.

During the course of the interview, the Examiner indicated that U.S. Patent No. 4,893,223 (Arnold) appeared to be of interest. It is noted that this reference is not directed to the detection of foreign substances in a thread. Rather, it is particularly directed to the inspection of the relative positions of ends of terminal pins on surface mount integrated circuit components.

Reconsideration and withdrawal of the rejections, and allowance of all pending claims are respectfully requested.

Respectfully submitted,

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